Space Weather Forecast

Issued on Sunday, 26 February 2023 at 13:03 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2 Minor to Moderate storms, and a chance G3 Strong Storms late 26 Feb or 27 Feb, due to CME arrivals. R1-R2 Radio Blackouts expected throughout, with a slight chance R3.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with two Moderate-class flares in the last 24 hours, with peak flare from a sunspot in the northwest. There are seven sunspot regions on the Earth facing disc. A spot in the northeast remains the longest and largest spot at present, with magnetic complexity. A spot in the southeast is the second largest region, also possessing magnetic complexity. The aforementioned spot in the northwest has shown a slight decline in recent hours, though it's magnetic field lines have become rather twisted since the recent Modearate flare. The remaining sunspot regions are small and simple.

Solar Wind / Geomagnetic Activity: Solar winds have been at mostly slightly elevated levels, ranging between 400-450km/s, before recently increasing to near elevated levels, due to the arrival of a fast wind from a coronal hole, with speeds currently around 500km/s. The total interplanetary magnetic field strength started weak, becoming mostly moderate from 25/1700 UTC. The important north-south component was mostly negative, with a prolonged period of weak-moderate negative between 25/1400-1900 UTC, varying between +8 to -8 nT.

Geomagnetic activity increased from Quiet (Kp 2) to become Unsettled or Active (Kp 3-4) to end the period.

Energetic Particles / Solar Radiation: The count rate of energetic particles increased due to the arrival of high energy protons from the Moderate flare and filament eruption. This is currently still rising, but breached the S1 Minor Storm threshold at 25/2110 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is forecast to continue with further Moderate-class flares expected (R1-R2), and a slight chance of increasing to High if any Strong-flares occur (R3).

Solar Wind / Geomagnetic Activity: There are potentially two Earth directed coronal mass ejections (CMEs) in the forecast, the first is expected to arrive later 26 Feb and the second may arrive on 27 or 28 Feb. Earth has now entered into a fast wind from coronal hole 79, which is currently facing Earth. Solar winds are expected to increase to between 500-600km/s, which are likely to increase further with the arrival of a CME later on the 26 Feb, with speeds possibly reaching between 600-700km/s. The Second CME may bring solar wind speeds between 500-650 km/s during the 27 or 28 Feb.

Mainly Quiet conditions are expected to increase 26 Feb to Unsettled to Active with a chance of G1 Minor Storms due to the arrival of a fast wind from a coronal hole. This rising further to give a

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spell of G1/Minor to G2/Moderate Storms due to the coronal mass ejection (CME) arrival, and a chance of an isolated G3/Strong Storm interval. Initial CME effects may ease later 27 Feb or into 28 Feb though the arrival of the CME from 25 Feb brings a further chance of G1/Minor or G2/Moderate storms and a slight chance of a further G3/Strong storm from late 27 Feb until early 01 Mar.

Energetic Particles / Solar Radiation: S1 Minor Storm levels are currently occurring. The count rate of energetic particles (high energy protons) is expected to continue declining towards background levels, with a slight chance of increasing again through the period due to any significant flares that may occur. This giving a slight chance of S1/Minor Radiation Storms from 27 Feb.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	70	50	30
Strong	G3	No	30	30	10	1
Severe	G4	No	5	5	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	70	60	60
Very Active	R3 to R5 X	No	15	15	10	10

Solar Radiation Storms - (High Energy Protons):

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Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	Yes	99	50	30	20
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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